



Department of
**Environment &
Conservation**

PROGRAM YEAR 2017

HIGHLIGHTS REPORT

OFFICE OF ENERGY PROGRAMS

CONTENTS

ABOUT THE OFFICE OF ENERGY PROGRAMS



The Tennessee Department of Environment and Conservation's (TDEC) Office of Energy Programs (OEP) is comprised of two sections: the Governor-designated State Energy Office (SEO) and the State Facility Utility Management Section (SFUM). Through its activities, OEP promotes the efficient, effective use of energy to enhance the environmental and economic health of the state. OEP provides education, outreach, technical assistance, and/or funding and financing opportunities for the following:

- ✚ Energy efficiency and conservation
- ✚ Renewable energy
- ✚ Utility data management
- ✚ Energy assurance and resiliency
- ✚ Sustainable transportation and alternative fuels

This report highlights some of OEP's key activities throughout Program Year 2017. Learn more about OEP at <https://www.tn.gov/environment/energy>.

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THE U.S. DEPARTMENT OF ENERGY'S STATE ENERGY PROGRAM ANNUAL FUNDING ACTIVITIES

1

OEP's primary activity areas under the U.S. DOE State Energy Program Annual Funding include energy assurance, clean energy financing, public education and outreach, K-12 energy education, and energy in transportation.

2

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TDEC provided a grant to the City of Bristol to provide qualifying low-to-moderate income homeowners with a free in-home energy evaluation, a customized implementation plan by the local utility, and up to \$20,000 per home in financial assistance to install recommended energy efficiency upgrades.

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OEP has received multiple State Energy Program Competitive Awards to support activities ranging from the advancement of energy efficiency in wastewater facilities to the stimulation of energy investment in local jurisdictions, K-12 public schools, and public housing authorities.

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Through the Middle-West Tennessee Clean Fuels Coalition, OEP promotes and educates Tennessee citizens about alternative fuels, advanced vehicle technologies, and sustainable transportation options.

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OEP's State Facility Utility Management section is committed to maximizing utility savings opportunities for State-owned and managed properties. The team's current focus is on the development of an online utility data management platform, as well as monitoring the progress of and providing technical assistance for energy efficiency projects in State-owned facilities.

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This section provides Tennessee-specific graphs and data related to the state's energy and emissions profile, including information on energy consumption, production, prices, and expenditures as well as emissions by sector.



ENERGY ASSURANCE PLANNING AND PREPAREDNESS

OEP is responsible for enhancing Tennessee's preparedness for disruptions to the state's energy resources, particularly those related to transportation and heating fuels.



CLEAN ENERGY FINANCING

OEP provides technical assistance and/or funding and financing opportunities for energy efficiency and renewable energy improvements.



PUBLIC EDUCATION & OUTREACH

OEP provides outreach and education to promote awareness of energy efficiency, renewable energy, energy management and sustainable transportation options to individuals and organizations throughout the state.



K-12 ENERGY EDUCATION

OEP has a long history of supporting K-12 energy education through professional development and student learning opportunities.



ENERGY IN TRANSPORTATION

OEP engages in a variety of activities to promote and educate citizens about alternative fuels, advanced vehicle technologies, and sustainable transportation.

1

THE U.S. DEPARTMENT OF ENERGY STATE ENERGY PROGRAM ANNUAL FUNDING ACTIVITIES

The U.S. Department of Energy's (DOE) State Energy Program (SEP) provides funding and technical assistance to states, territories, and the District of Columbia to enhance energy security, advance state-led energy initiatives, and maximize the benefits of decreasing energy waste.

SEP aids states in developing policies, strategies, and goals that address each state's energy needs and priorities:

- ✦ Increase energy efficiency to reduce energy costs and consumption for consumers, businesses, and government
- ✦ Reduce reliance on imported energy
- ✦ Improve the reliability of electricity and fuel supply and the delivery of energy services
- ✦ Reduce the impacts of energy production and use on the environment

Specifically, SEP provides leadership to maximize the benefits of energy efficiency and renewable energy in each state through education, outreach and technical assistance activities, as well as through technology deployment and by providing access to new partnerships and resources. In addition, SEP helps states prepare for natural disasters and improve the security of energy infrastructure through the preparation of energy emergency / energy assurance plans.

ENERGY ASSURANCE PLANNING AND PREPAREDNESS

OEP is responsible for enhancing Tennessee's preparedness for disruptions to the state's energy resources, particularly those related to transportation and heating fuels. This work includes the ongoing development of the State's Energy Assurance Plan and Tennessee Petroleum Contingency Plan—in cooperation with other State agencies and private industry stakeholders—and responding to all Emergency Support Function 12 (ESF-12) activities under the Tennessee Emergency Management Plan (TEMP). ESF-12 related activities also involve attendance at DOE energy emergency planning seminars and service as the primary ESF-12 Emergency Services Coordinators (ESCs) to the Tennessee Emergency Management Agency (TEMA). In addition, OEP staff members serve as the State's Energy Emergency Assurance Coordinators (EEACs) for DOE's Office of Electricity Delivery and Energy Reliability, Infrastructure Security and Energy Restoration (ISER) Division.¹ Under this program, EEACs act as points of contact in each state during an energy emergency.

EMERGENCY RESPONSE ACTION

On October 31, 2016, a Colonial Pipeline contractor crew working on a gasoline pipeline just outside of Birmingham, Alabama struck a below-ground, 36-inch steel transmission pipeline and ignited the gasoline inside the line. The rupture resulted in the discharge of 138,600 gallons of gasoline. Colonial Pipeline supplies 70% of Middle and East Tennessee's liquid petroleum fuel. OEP's ESCs

began monitoring the situation and communicated frequently with petroleum industry stakeholders, DOE's EEAC network, and TEMA to respond to the resulting supply disruption. These monitoring activities allowed OEP to keep its public sector partners—the Tennessee Department of Agriculture, Tennessee Department of Transportation (TDOT), and various TDEC divisions (Office of General Counsel, Air Pollution Control, Emergency Services)—apprised of the market supply across Middle and East Tennessee. OEP also leveraged these monitoring activities to resolve any local government first responder fuel shortages. Throughout this process, OEP implemented lessons learned from the September 2016 Colonial Pipeline petroleum disruption; this resulted in improved messaging from both the petroleum industry and from State government, which helped to prevent panic buying at gas stations in Middle and East Tennessee.

Other emergency situations for which TDEC Office of Environmental Programs provided monitoring/assistance:

- ✦ Valero Refinery Incident in Memphis, November 2016 and July 2017
- ✦ Historic drought and wildfires in East Tennessee, November – December 2016
- ✦ Tropical Storm Cindy, June 2017
- ✦ Hurricanes Harvey, Irma, Jose and Maria, August 23 – September 18, 2017

¹ In early calendar year 2018, the ISER Division was moved under the newly created DOE Office of Cybersecurity, Energy Security, and Emergency Response (CESER).

HIGHLIGHTS OF EMERGENCY RESPONSE

COORDINATING MEDIA MESSAGING
to reassure the public

PREPARING SITUATIONAL REPORTS
for Governor's office and others

COLLECTING INFO ON PETROLEUM INVENTORIES
from public and private petroleum industry stakeholders

PRIORITIZING FIRST RESPONDER NEEDS
during fuel disruptions



CLEAN ENERGY FINANCING

QUALIFIED ENERGY CONSERVATION BOND PROGRAM

OEP administers Tennessee’s Qualified Energy Conservation Bonds (QECB) program in collaboration with the Tennessee Local Development Authority (TLDA), the entity allowed to allocate Tennessee’s QECB capacity. During the Program Year, OEP continued working with TLDA and the local jurisdictions that intend to or are utilizing their Large Local Jurisdiction (LLJ) allocations and/ or have been awarded sub-allocations through the State’s Request for Proposal (RFP) process:

- ✦ **Memphis:** The City of Memphis combined its initial \$7,014,356 QECB allocation and its RFP sub-allocation of \$3,657,644 to support energy improvement projects under its Green Communities Program. The Crosstown Concourse issuance of \$8,316,000 closed on February 18, 2015. The Self Tucker/Universal Life and Knowledge Quest issuances, which had allocations of \$2,015,300 million and \$340,700, respectively, closed on April 29th, 2015. These three projects all focus on building energy efficiency retrofits:
 - Crosstown Concourse: the redevelopment of a 1.5 million square foot former Sears distribution center into a mixed use vertical urban village
 - Knowledge Quest: the redevelopment of a vacant apartment building into dormitory housing for an urban farming school
 - Universal Life Insurance Building: the redevelopment of a historic African American-owned insurance company building into a new office space
- ✦ **City of Lebanon:** OEP recommended and TLDA approved a \$3,500,000 sub-allocation for the construction and installation of a waste-to-energy gasification unit. Issuance on this project closed on April 24th, 2015. The system provides nearly 200kW of power (half the total load of the wastewater treatment plant) while diverting over 32 tons of waste (wood, tires, and biosolid sewer sludge) from landfills every day.
- ✦ **Knox County:** OEP recommended and TLDA approved a \$12,500,000 sub-allocation for the installation of solar photovoltaic systems on 14 targeted sites across the county, notably on public school rooftops. Issuance on this project closed on June 30, 2015.

- ✦ **Clarksville:** The City of Clarksville utilized its LLJ allocation to finance a street light improvement project, which resulted in the conversion of 2,580 street lights to light emitting diode (LED) technology. Bond issuance for this project (\$1,240,000) closed on March 23, 2016.
- ✦ **City of Paris:** OEP recommended and TLDA approved a sub-allocation for an energy savings performance contract that will include the upgrade of street lights to LED technology, conversion of lighting within select City-owned buildings to LED lighting technology, the addition of intelligent thermostats on heating, ventilation, and air conditioning (HVAC) systems, the addition of energy-saving vending machine controls, and an upgrade to the Civic Center’s indoor pool dehumidifier. Issuance of \$2,530,000 in QECBs closed on June 5, 2017.
- ✦ **Williamson County:** OEP recommended and TLDA approved a sub-allocation to finance the first of at least three phases of an energy savings performance contract. During the first phase, various energy conservation measures will be performed within 13 Williamson County Schools. Issuance of \$10,115,000 in QECBs closed on August 30, 2017.
- ✦ **Memphis:** OEP recommended and TLDA approved a \$2,142,850 sub-allocation, which will support energy efficiency upgrades to the Memphis Green Communities Program’s Southbrook Towne Center. The project includes the replacement of the roof with an energy efficient roof system, an upgrade of the building’s HVAC systems, and an upgrade to the building’s electrical power grid. Issuance on this project is expected to occur in the fourth calendar quarter of 2017.

PATHWAY LENDING ENERGY EFFICIENCY PROGRAM

The Pathway Lending Energy Efficiency Loan Program (EELP), a low-interest revolving loan fund, launched in 2010 to assist both for-profit and not-for-profit commercial and industrial businesses in implementing energy efficiency and renewable energy improvements. As of January 4, 2016, the program was expanded to offer financing to Tennessee local governmental entities, including municipalities, counties, school districts, and other similar public agencies.

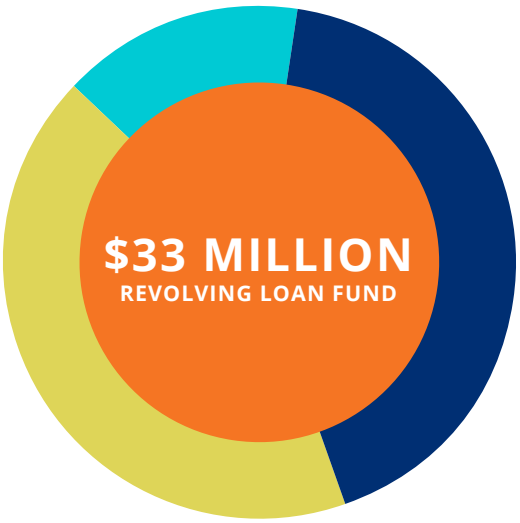
2016 – 2017

ENERGY EFFICIENCY LOAN PROGRAM OVERVIEW

PATHWAY LENDING
\$5 MILLION

TVA
\$14 MILLION

TDEC OEP
\$14 MILLION



AVERAGE LOAN
\$23,632

2% FIXED RATE
FOR 5-YEAR ENERGY
EFFICIENCY LOAN

5% FIXED RATE
FOR 10-YEAR RENEWABLE
ENERGY LOAN



\$5.3
MILLION
IN NEW LOANS

PROVIDED TO



33
TENNESSEE
BUSINESSES
AND ORGANIZATIONS

ENERGY EFFICIENCY LOAN PROGRAM PROJECTS

- 1 ENERGY EFFICIENT UPGRADES
 - 2 BUILDING ENVELOPE RETROFITS
 - 3 COOL ROOFS
 - 4 RENEWABLE ENERGY INSTALLATIONS
 - 5 CO-GENERATION
- AND MORE



PUBLIC EDUCATION AND OUTREACH

OEP engages in public education and outreach to promote awareness of energy efficiency, renewable energy, energy management, and sustainable transportation options to individuals and organizations throughout the state. OEP works with various stakeholders to support the delivery of educational content and to assist in the execution of targeted outreach events to the residential, commercial, industrial, and/or public energy sectors. In addition, OEP shares energy information via social media, targeted email blasts, monthly newsletters, and OEP's website, available at: <http://www.tn.gov/environment/energy>.

WORKSHOPS, PRESENTATIONS, AND SPEAKING ENGAGEMENTS

Throughout the year, OEP staff presented at various workshops and conferences to promote programs, funding and technical assistance opportunities, and DOE efforts. Examples of such events include the Tennessee Chamber of Commerce and Industry's 34th Annual Environment and Energy Conference, the Tennessee Renewable Energy and Economic Development Council's 3rd Annual Renewable Energy International Conference at Tennessee Tech University, the DOE Better Buildings Conference in Washington, D.C., the Tennessee Valley Public Power Association Joint Customer Services & Communications Conference, Tennessee Advanced Energy Business Council's "Opportunities in Energy" meeting at the Howard Baker Jr. Center for Public Policy, and the TDEC Environmental Show of the South

K-12 ENERGY EDUCATION

OEP has a long history of supporting K-12 energy education through professional development and student learning opportunities. OEP's offerings for the Program Year included Energy Education Camps for K-12 Educators and Energy Education Workshops for both educators and students. These offerings connect the broad topic of energy to science, technology, engineering, and math (STEM) subjects and provide educators with the knowledge and resources necessary to teach energy concepts.

In addition to the Energy Education Camps for K-12 Educators and Energy Education Workshops, OEP continued to support the National Energy Education Development (NEED) Project. The mission of the NEED Project is to promote an energy conscious and educated society by creating effective networks of students, educators, and business, government, and community leaders to design and deliver objective, multi-sided energy education programs.

ENERGY EDUCATION CAMPS FOR K-12 EDUCATORS

OEP's 2017 Energy Education Camps for Educators were held at Montgomery Bell State Park and Pickwick Landing State Park. The tuition-free camps were comprised of three-day training sessions and were offered on a first-come, first-served basis. A total of 80 teachers from 29 counties attended.

The camps were comprised of three-day training sessions and provided energy-related lesson plans and resources designed for use in the K-12 classroom. These lessons promote energy literacy as it relates to STEM subjects and introduce educators to topics including, but not limited to, electricity generation, consumption, and measurement; renewable energy; and energy efficiency and conservation.

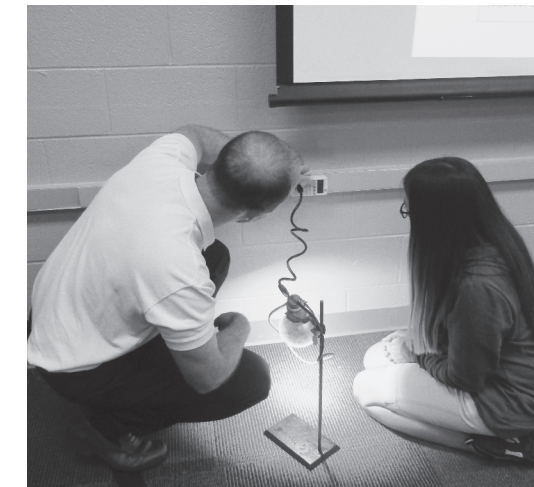
"This has been the BEST [professional development opportunity] I have ever participated in. The activities were great, and I can't wait to try them in my classroom. The fellowship with other science teachers has been inspiring and enlightening."

Leanne Shell,
Etowah City School

In addition to addressing Tennessee science curriculum standards, the camps offered "team building" energy-related activities for teachers, including plug loads assessments, a solar scavenger hunt, a game of Energy Jeopardy, and the construction of solar houses. Special breakout sessions were conducted with grade-level clusters to ensure that all participating teachers left the camps with ideas for their classrooms. Participants received educational products to utilize in their energy-related education lessons, including Electric Circuits Kitbooks (a Tennessee-made educational tool) and Kill-A-Watt meters.

ENERGY EDUCATION WORKSHOPS

OEP hosted its first series of Energy Education Workshops at Neely's Bend Elementary School in August 2017. The workshops focused on the 2017 Total Solar Eclipse and a variety of related solar energy topics. Students experimented with radiometers and solar balloons and built solar cars in celebration of the eclipse. A total of 448 students attended the workshops, and each student took home both a map of the path of totality across the U.S. and a pair of eclipse viewing glasses. Additionally, a total of 100 educational eclipse booklets were distributed to the third grade classes.





ENERGY IN TRANSPORTATION

OEP engages in a variety of activities to promote and educate citizens about alternative fuels, advanced vehicle technologies, and sustainable transportation. By prioritizing and educating citizens on the aspects of energy use in transportation, OEP seeks to reduce energy costs within the transportation sector, increase the energy efficiency of the transportation sector, enhance resiliency and emergency preparedness through diversification of available fuels, and promote economic growth and improved environmental quality.

TENNESSEE SUSTAINABLE TRANSPORTATION AWARDS

Throughout the Program Year, OEP coordinated planning and logistics for the third annual Tennessee Sustainable Transportation Awards and Forum, which was held on May 23-24, 2017 at the Nashville Public Library, to coincide with Clean Air Month.

For the event, Tennessee Clean Fuels assembled the largest gathering of alternative fuel vehicles and equipment in State history with a showcase of over 40 vehicles. Vehicle fuels included electric and hybrid, propane autogas, compressed and liquefied natural gas (CNG and LNG), ethanol and biodiesel biofuels, and hydrogen.

The Tennessee Sustainable Transportation Awards recognize outstanding initiatives to improve the efficiency, accessibility, affordability, and sustainability of transportation systems in the state, consistent with ongoing efforts to improve the health and well-being of Tennesseans, provide for a strong economy, and protect the state's natural resources. An awards luncheon was held on the second day of the forum, to highlight the following 11 awardees: Chattanooga Area Regional Transportation Authority; Chattanooga-Hamilton County Regional

Planning Agency; City of Johnson City; IdleAir and Covenant Transportation Group, Inc.; Knox County Department of Engineering and Public Works; Memphis Light, Gas, and Water; Metropolitan Nashville-Davidson County Public Works Department; TDOT; the TMA Group (Transportation Management Association); and UPS (United Parcel Service, Inc.).

For more information about the awards, visit: <https://www.tn.gov/environment/TSTA>. The fourth annual Tennessee Sustainable Transportation Awards and Forum is scheduled to take place September 17-18, 2018 in Knoxville.

INITIATIVE FOR RESILIENCY IN ENERGY THROUGH VEHICLES (IREV)

OEP contributed efforts to the National Association of State Energy Officials (NASEO's) iREV project, which supports state and local emergency management decision makers by providing customized tools, information, and strategies about alternative fuel vehicle technologies, infrastructure, and potential uses in emergency scenarios. OEP and TEMA participated on behalf of the State of Tennessee as an iREV pilot partner. Through this pilot, NASEO:

- ✦ Worked with the State to identify relevant emergency operations plans and energy assurance plans, and understand local emergency management policy and operations
- ✦ Reviewed emergency operations and energy assurance plans and identified ways that the plans could incorporate one or more alternative fuels
- ✦ Worked with the local DOE Clean Cities Coalitions and fleet managers to identify the locations of alternative fuel vehicles and stations within Tennessee, and uploaded this information into an iREV-Tracking Tool
- ✦ Worked with the State to develop a "Policy and Planning Toolkit," which included a summary of findings and recommended steps the jurisdiction can take to incorporate alternative fuels into future plans, based on local processes

As part of this pilot project, OEP staff also worked with the Clean Cities Coalitions to request permission from alternative fueled fleets in Tennessee, in order to share their fleet data with TEMA via the iREV tracking tool. The tool allows TEMA to map an incident and see the types of alternative fuel vehicles available to assist with emergency response within a certain area.

VOLKSWAGEN DIESEL SETTLEMENT

In 2015, Volkswagen (VW) publicly admitted that it had secretly and deliberately installed a defeat device—software designed to cheat emissions tests and deceive federal and state regulators—in approximately 590,000 model year 2009 to 2016 motor vehicles containing 2.0 and 3.0 liter diesel engines. The United States Department of Justice filed a complaint against VW, alleging that the company had violated the Clean Air Act. In October 2016 and May 2017, the U.S. District Court, Northern District of California, approved two partial settlements related to the affected 2.0 and 3.0 liter vehicles, respectively, totaling \$14.9 billion (“the VW Settlement”).

The VW Settlement will be implemented through the First Partial Consent Decree and Second Partial Consent Decree. Under these consent decrees, VW has agreed to: (1) dedicate \$10 Billion to the recall of at least 85% of the affected 2.0 and 3.0 liter vehicles; (2) invest \$2 Billion in zero-emission vehicle infrastructure and promotion (“Zero Emission Vehicle [ZEV] Investment Plan”); and (3) establish a \$2.9 Billion Environmental Mitigation Trust (EMT) to mitigate the environmental effects of the excess NOx emissions from the affected vehicles. The State’s initial allocation under the first and second partial consent decrees is \$45,759,914.40. Governor Haslam has identified TDEC as the Lead Agency for purposes of administering the State’s EMT allocation, and TDEC’s Commissioner designated the OEP Assistant Commissioner as the Administrative Lead for both the EMT and the ZEV Investment Plan.

With regard to the EMT, the Administrative Lead is responsible for (1) coordinating with TDEC Office of General Counsel (OGC) and the Attorney General’s Office to apply for Beneficiary status on behalf of the State, (2) coordinating the efforts of a TDEC VW Advisory Council and all aspects of the development of a Beneficiary Mitigation Plan (BMP), and (3) overseeing the administration of the State’s EMT allocation. With regard to the ZEV Investment Plan, the Administrative Lead is responsible for providing stakeholders opportunities to engage with Electrify America, LLC, to learn about the development and future implementation of the ZEV Investment Plan and preparing responses to related solicitations and/or requests for information.

TENNESSEE NATURAL GAS AND PROPANE VEHICLE GRANT PROGRAM

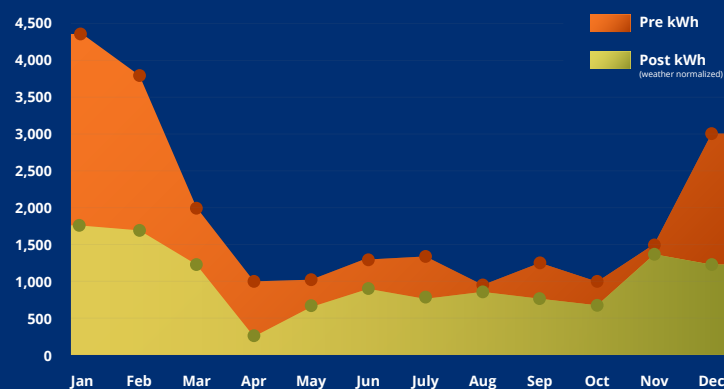
In October 2016, OEP launched the first round of the Tennessee Natural Gas and Propane Vehicle Grant Program, which offered grant funding to public, non-profit, and private fleets in Tennessee that proposed to purchase three or more qualifying “medium-duty” or “heavy-duty” natural gas or propane powered vehicles. The following entities were selected to receive funding totaling \$472,395:

- ✦ Knoxville Utilities Board, to purchase three natural gas Freightliner M2 112 trucks
- ✦ Piedmont Natural Gas, to purchase six natural gas Freightliner M2 112 trucks
- ✦ Sevier County Utility District, to purchase one natural gas Ford F650 dump truck, one dedicated natural gas Ford F450 truck, and one natural gas Kenworth T880 refuse hauler
- ✦ United Parcel Service, Inc., to purchase twelve natural gas Kenworth T680 trucks

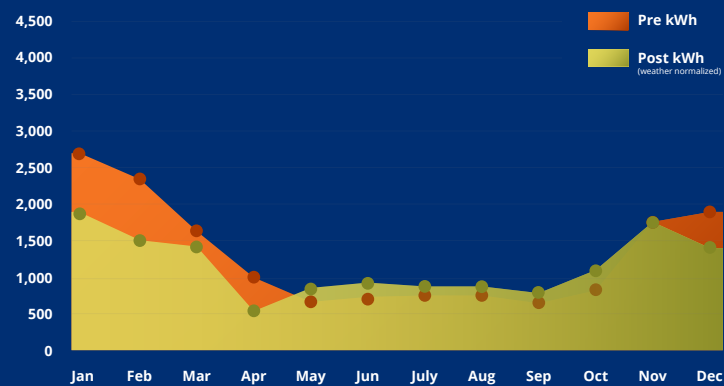


CITY OF BRISTOL ENERGY EFFICIENCY ASSISTANCE PROGRAM

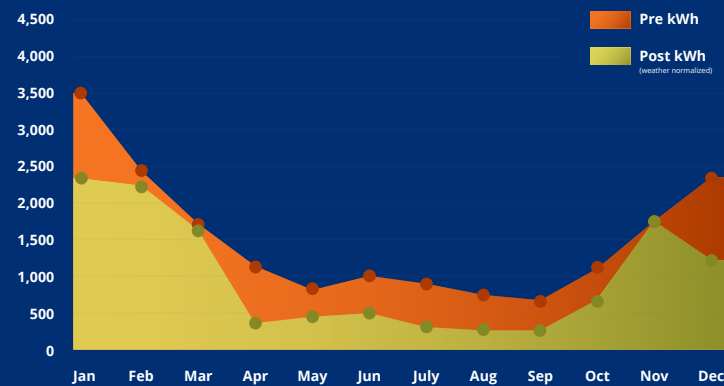
House A



House B



House C



City of Bristol

PRE & POST ENERGY USAGE

These graphs show a monthly breakdown of the energy costs of the three homes before and after the updates from OEP.

In March 2014, TDEC provided a grant to the City of Bristol to design, develop, and deliver the Energy Efficiency Assistance Program (EEAP), a grant initiative to provide qualifying low-to-moderate-income homeowners with a free in-home energy evaluation, a customized implementation plan by the local utility (Bristol Tennessee Essential Services), and up to \$20,000 per home in financial assistance to install recommended energy efficiency upgrades.

EEAP was funded by a Clean Air Act settlement agreement between King Pharmaceuticals, LLC, EPA, and TDEC. OEP managed the grant for TDEC.

OEP, OPSP, and the Bristol Community Development Specialist collaborated to ensure that a total of 47 homes were upgraded by the close of the program on June 30, 2016. A total of 442 windows, 84 doors, 21 refrigerators, and 8 carbon monoxide detectors were replaced. Electrical upgrades were completed on 24 homes, and 43 homes received new insulation. HVAC up-

grades were completed on 30 homes. Energy Star Certified light bulbs were also offered to program participants.

The graphics on the next page illustrate the energy usage of three homes before and after projects were completed; these graphs illustrate three instances of significant electricity savings as a result of the energy efficiency retrofit.

THE U.S. DEPARTMENT OF ENERGY
STATE ENERGY PROGRAM
COMPETITIVE AWARDS

OEP has received multiple State Energy Program Competitive Awards to support activities ranging from the advancement of energy efficiency in wastewater facilities to the stimulation of energy investment in local jurisdictions, K-12 public schools, and public housing authorities.

**STIMULATING ENERGY INVESTMENT IN LOCAL JURISDICTIONS,
K-12 PUBLIC SCHOOLS, AND PUBLIC HOUSING AUTHORITIES**

OEP received an award under DOE's SEP 2013 Competitive Funding Opportunity to provide education, outreach, and technical assistance to local governments, K-12 schools, and public housing authorities in Tennessee in order to

drive demand for energy improvement investments. From July 15, 2014 to January 31, 2017, the OEP project team provided direct education, outreach, and technical assistance to over 346 entities and drove demand for energy improvement investments of over \$45 million in Tennessee.³

Wastewater Plant in Collierville, TN²

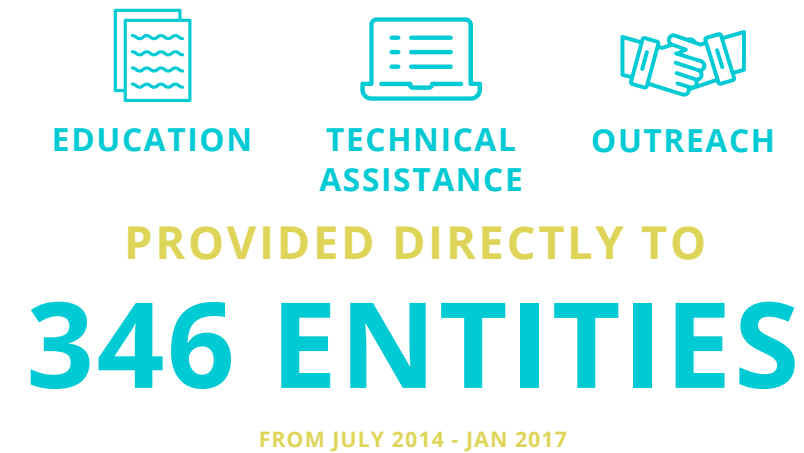
² Image courtesy of Town of Collierville.

³ Demand for energy improvement investments is defined here as either signed energy savings performance contracts (ESPCs) or planned projects.

The estimated energy cost savings for the current pipeline of planned projects is \$3,591,326. Program participants include:

- ✚ Bradley County Schools
- ✚ Cleveland Housing Authority
- ✚ The City of Knoxville
- ✚ Montgomery County
- ✚ Williamson County Schools

Estimated annual energy savings for program participants can be viewed on page 17.

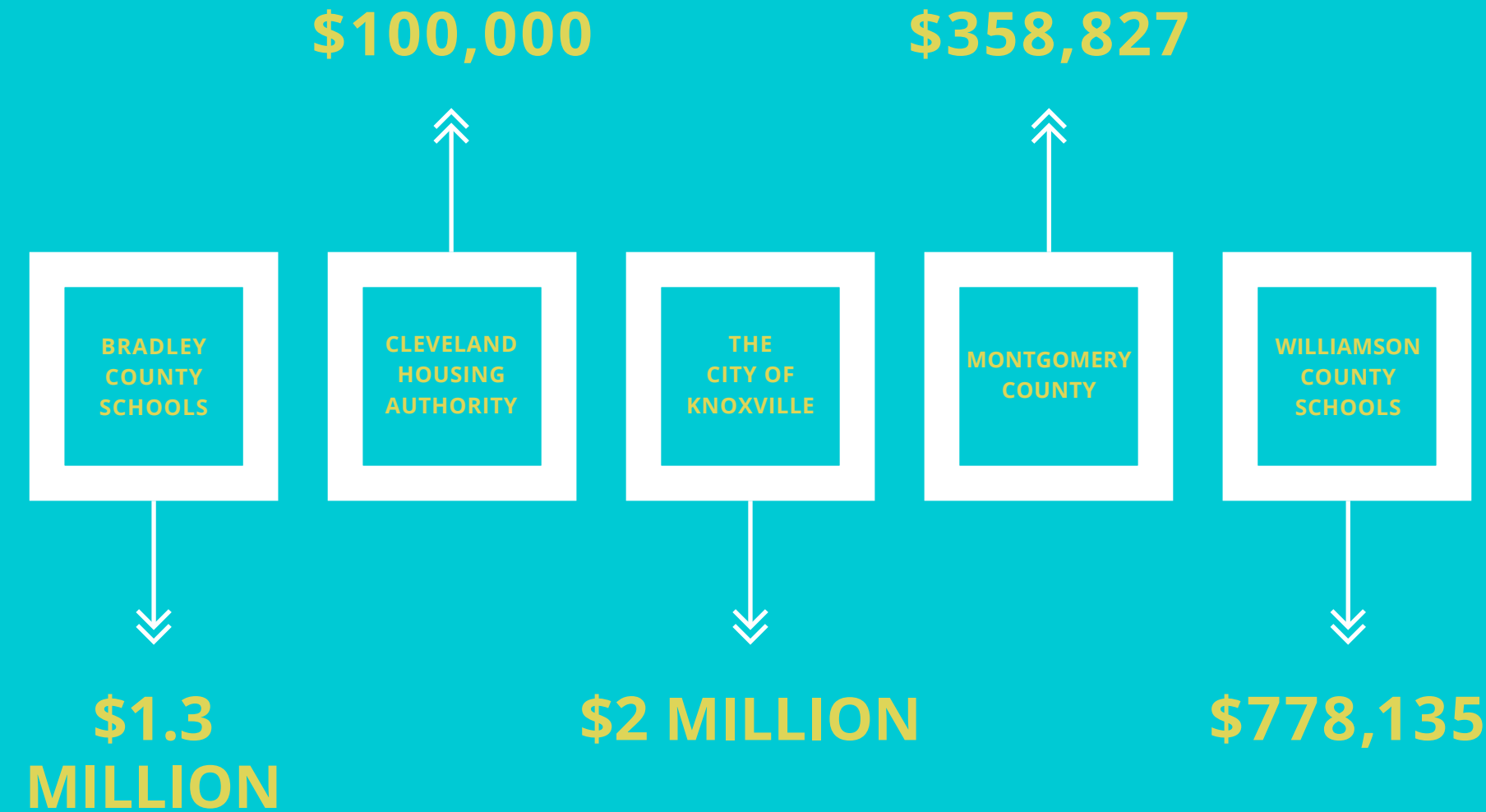


**ADVANCING ENERGY EFFICIENCY IN WASTEWATER UTILITIES
AND OTHER UNDERSERVED SECTORS IN TENNESSEE
AND ALABAMA**

To address potentially inefficient operational practices of water and wastewater systems, the TDEC Division of Water Resources and the Office of Policy and Sustainable Practices (OPSP) created the Wastewater Partnership in 2011 with U.S. EPA Region 4, the UT Municipal Technical Advisory Service (MTAS), the Tennessee Valley Authority (TVA), and the University of Memphis. From 2011 – 2015, the Partnership provided no-cost technical assistance to water and wastewater systems to identify measures, which, once implemented, resulted in operational efficiencies, energy cost savings, and/or a reduction in nutrient discharge. (Less nutrient leads to cleaner streams and rivers.) Participants that implemented the no-to-low cost recommendations saved an average of 19% in annual energy costs.

DOE provided an SEP Competitive Award to OEP to continue the efforts of the Partnership and assist the State of Alabama in the implementation of a similar program. In 2016, OEP began collaborating with the aforementioned partners and the Alabama Departments of Environmental Management and Economic and Community Affairs to drive adoption of energy efficiency projects and technologies in the water and wastewater sector. During this 30-month effort, the team will engage local governments in Tennessee and Alabama through free onsite energy assessments, technical workshops, and energy management implementation support.

**ESTIMATED ANNUAL
ENERGY SAVINGS**



By September 30, 2017, the project team conducted 16 site visits, generated 16 energy assessment reports, held four workshops for wastewater treatment plants in Tennessee and Alabama, and conducted outreach to nearly 1,000 individuals. The workshops highlighted financial assistance available to water and wastewater utilities for capital improvements, and U.S. EPA Region 4, TVA, the University of Memphis, and Tennessee Technological University provided technical presentations on topics such as energy tracking and demand response.

Energy savings are being tracked via U.S. EPA Region 4's Energy Assessment Tool (EAT). EPA and TDEC continue to work with participating wastewater systems to build baseline energy data and collect post-implementation energy data. The following savings for participating systems have been estimated by the project team:

- ✦ Total energy = 4,358,200 kWh per year
- ✦ Energy savings as a percent of total energy consumption = average of 23% per wastewater system
- ✦ Total cost savings = \$390,468 per year
- ✦ Total Nitrogen Discharge Reduced = 190,390 pounds per year
- ✦ Total Nitrogen Discharge Reduced = 95 tons per year
- ✦ Total Nitrogen Discharge Reduced = average 40% reduction per wastewater system



ESTIMATED WASTEWATER TREATMENT

ENERGY SAVINGS

AS TRACKED BY THE U.S. EPA REGION 4

ENERGY ASSESSMENT TOOL

TOTAL SAVINGS PER YEAR

\$390,468



AVERAGE OF
40% Reduction
IN NITROGEN DISCHARGE
PER WASTEWATER SYSTEM

WHICH IS



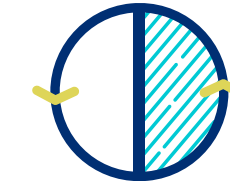
190,390 LBS

OR



95 TONS

OF NITROGEN DISCHARGE



AVERAGE OF
23% Savings
PER WASTEWATER SYSTEM



TOTAL ENERGY
4,358,200 kWh
PER YEAR



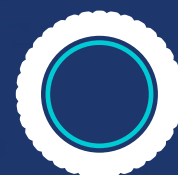
ALTERNATIVE FUELS



IDLE REDUCTION



FUEL ECONOMY



ADVANCED VEHICLE
TECHNOLOGIES

4

THE U.S. DEPARTMENT OF ENERGY
CLEAN CITIES PROGRAM

The DOE Clean Cities Program fosters the nation's economic, environmental, and energy security by working locally to advance affordable, domestic transportation fuels and technologies.

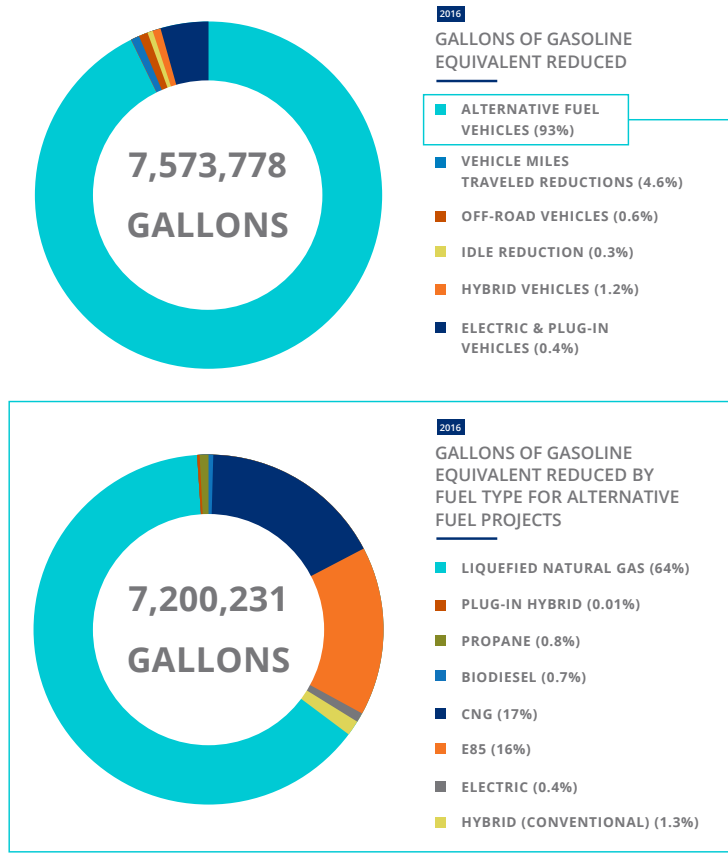
MIDDLE-WEST TENNESSEE CLEAN FUELS

A national network of nearly 100 Clean Cities coalitions brings together stakeholders in the public and private sectors to deploy alternative and renewable fuels, idle-reduction measures, fuel economy improvements, and new transportation technologies, as they emerge. In Tennessee, there are two DOE-designated Clean Cities Coalitions: The Middle-West Tennessee Clean Fuels Coalition (MWTCF) and the East Tennessee Clean Fuels Coalition (ETCF). Collectively, these two coalitions are known as Tennessee Clean Fuels. The website for these two coalitions may be accessed at: <http://www.tncleanfuels.org/>.

In compliance with eligible activities and DOE grant deliverables, OEP staff conducted the following key activities on behalf of MWTCF during the Program Year:

- ✚ Tracked petroleum reduction and outreach metrics throughout the year and submitted this information in an Annual Progress Report to DOE;
- ✚ Identified and tracked alternative fuel station opening and closing information and kept DOE abreast of any refueling site openings, closings, and status changes;

THE GRAPHS BELOW SHOW KEY FINDINGS FROM THE ANNUAL PROGRESS REPORT THAT COVERED ACTIVITY BY FLEETS IN MIDDLE-WEST TENNESSEE IN CALENDAR YEAR 2016.





Close up of an LED light

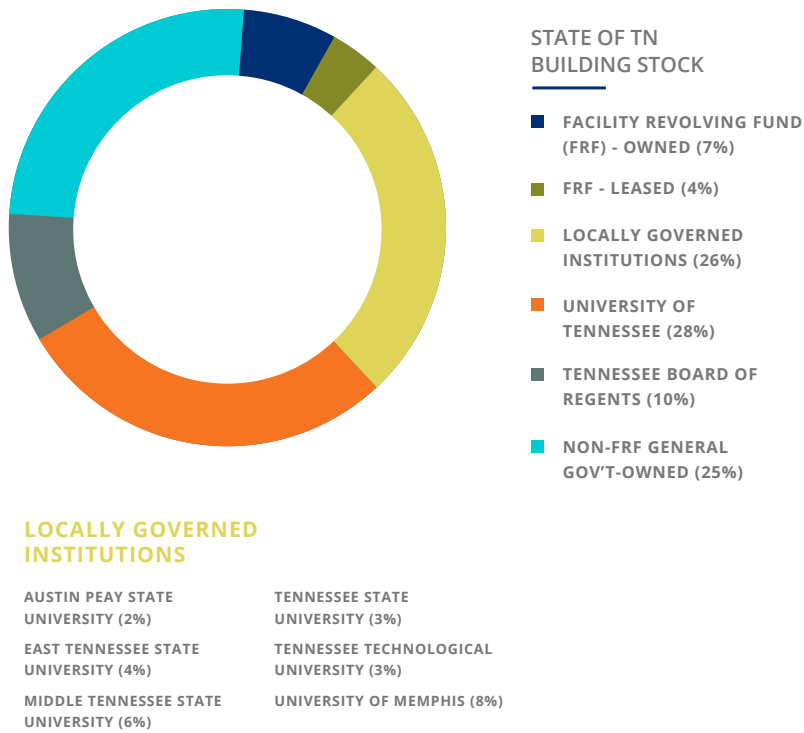
OEP’s State Facility Utility Management section is committed to maximizing utility savings opportunities for State-owned and managed properties.

To maximize utility savings opportunities for State facilities, the State building energy management statutory responsibilities for State-owned and managed properties (Tenn. Code Ann. §§ 4-3-1012 and 4-3-1017-1019) were transferred from the Department of General Services (DGS) to TDEC OEP via Executive Order No. 63 on January 1, 2017 (see <https://publications.tnsosfiles.com/pub/execorders/exec-orders-haslam63.pdf>). These statutory responsibilities are now overseen by the TDEC OEP SFUM section.

UTILITY DATA MANAGEMENT (UDM) SYSTEM

In April 2015, the Tennessee General Assembly approved \$6.2 million in FY2016 funding for the acquisition and implementation of a statewide energy

management system. Following a competitive solicitation process, the State approved a multi-year contract with EnergyCAP, Inc., to provide UDM software to all State-owned and operated facilities (97,000,000+ square feet). The UDM system offers an online platform that, once implemented, will centralize historical and ongoing utility data in State owned and operated facilities. This system provides a means for end users such as State facility and utility managers, fiscal personnel, technical assistance providers, sustainability professionals, and SFUM team members to gain actionable insights into their utility data.



5 Simple payback definition for EmPower Projects: EmPower funding/total estimated annual energy cost saved (\$).

- By the end of the Program Year, the following project milestones were accomplished:
- + 70% of State utility meters associated with their corresponding facilities;
 - + 47% of State accounts associated with their corresponding cost centers;
 - + ~37% of utility accounts processed (with regard to initial contact established, historical data formatting and input, and receipt of ongoing data); and
 - + Initial contact with 241 of the State's 353 utility vendors was established.

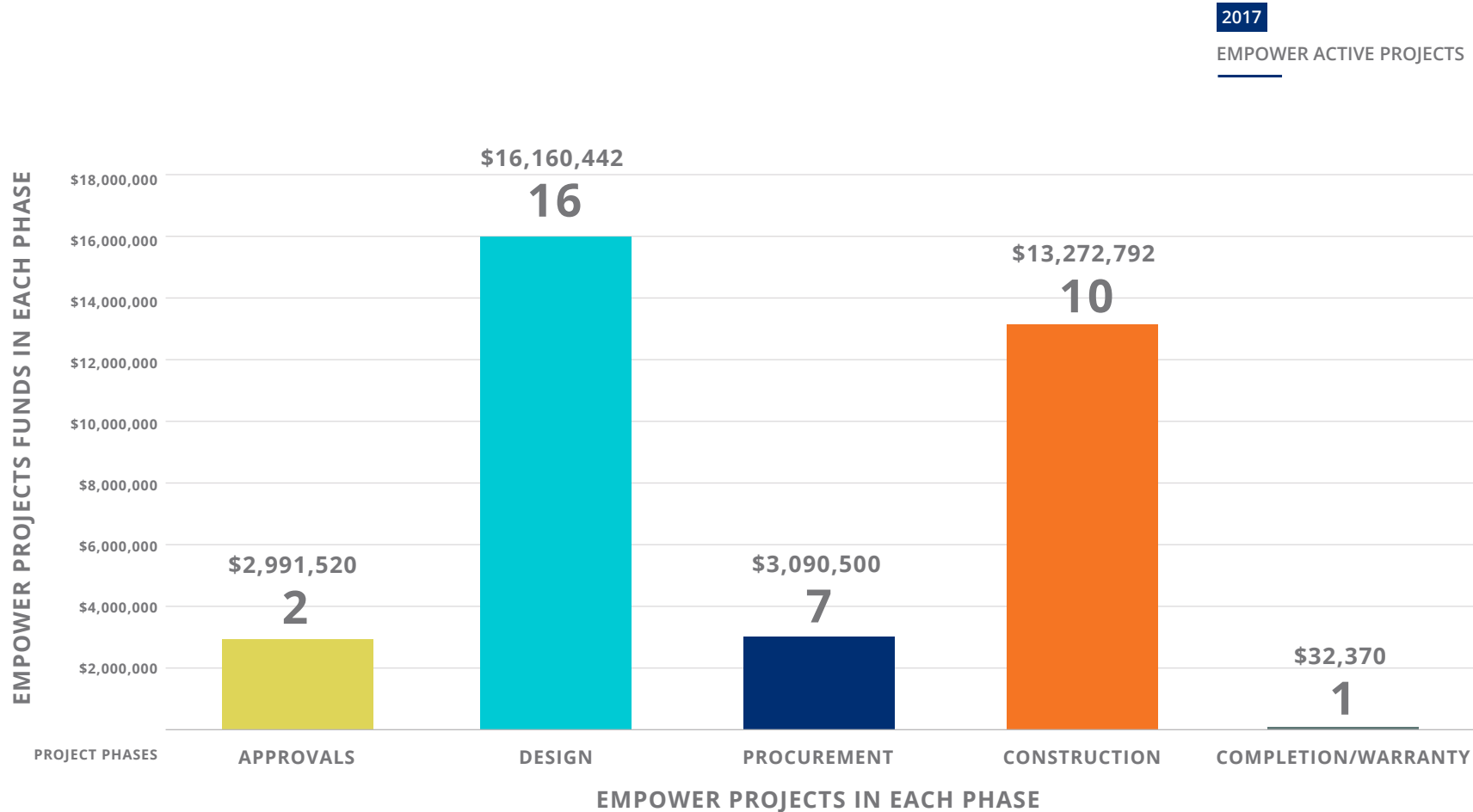
EMPOWER TN ENERGY EFFICIENCY PROJECTS

In April 2015, the Tennessee General Assembly approved \$37.5 million in FY2016 funding for EmPower TN energy efficiency projects in State-owned facilities.

As of September 30, 2017:

- + \$35,547,624 of the \$37.5 million had been obligated to 36 projects under the General Government, the Tennessee Board of Regents (TBR), and the University of Tennessee System (UT) real estate portfolios. The projects' cumulative estimated annual energy savings is \$4,540,763.
- + The projects' cumulative average simple payback⁵ is 7.8 years.

The following bar chart highlights the progress of the EmPower TN projects through each phase of the capital project process and is current as of September 2017. The left hand side of the graph references the EmPower TN energy efficiency allocation of \$37.5M, and each bar represents the total number of projects and the dollar amount for each phase.



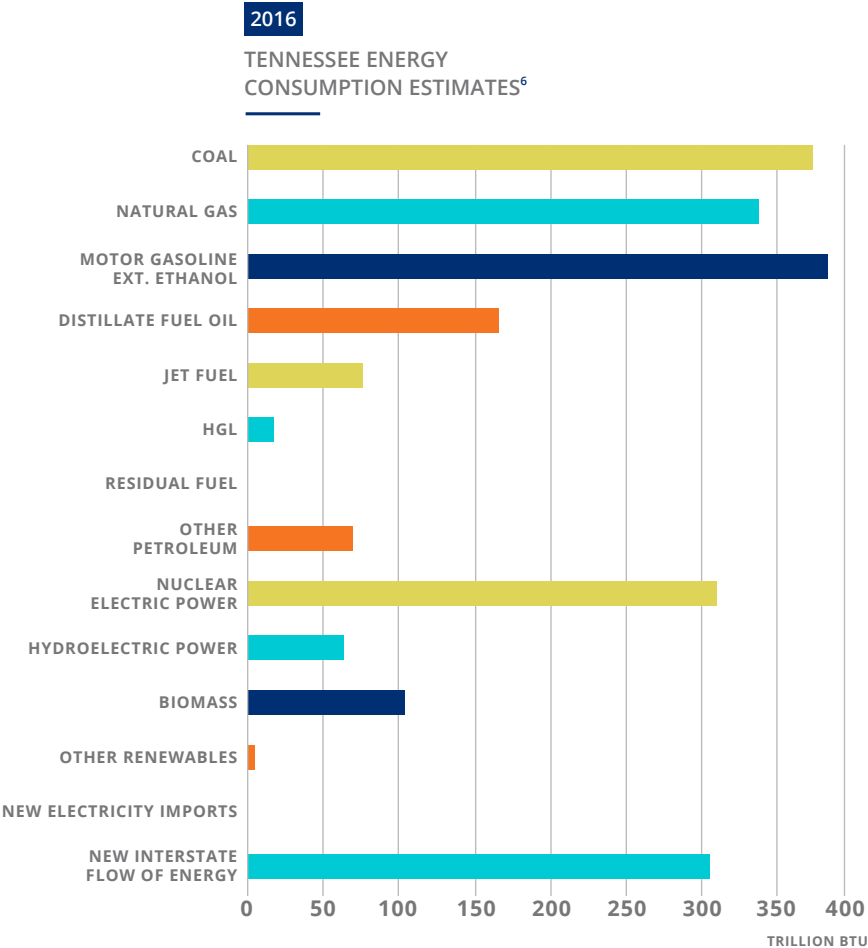
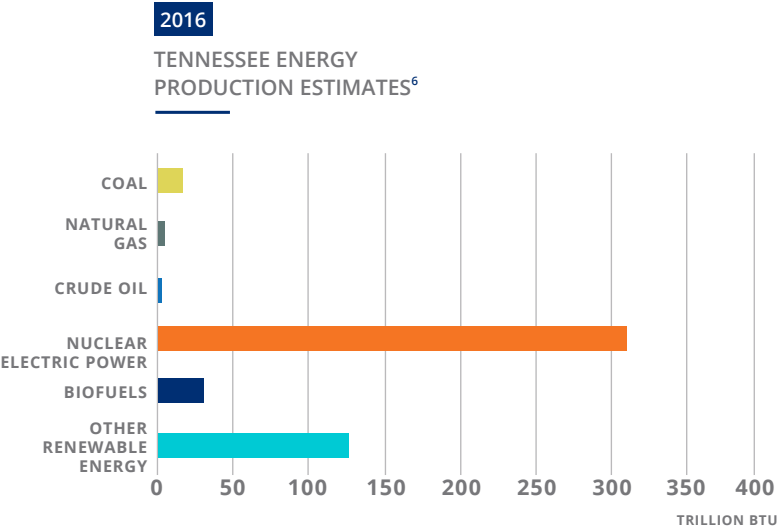


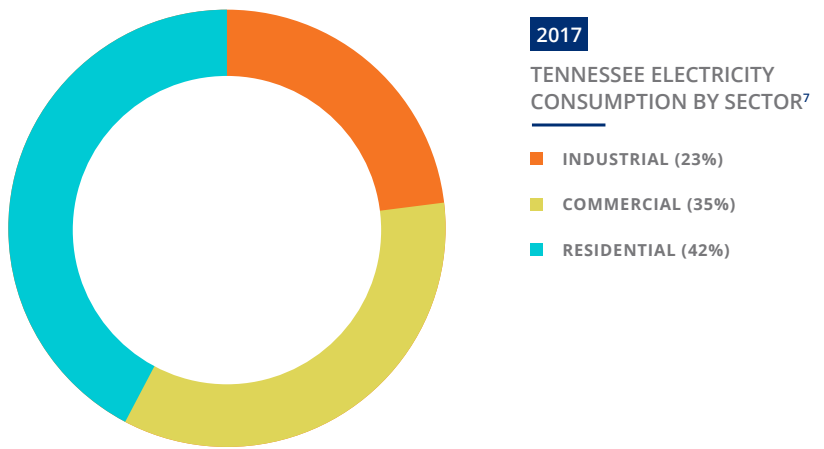
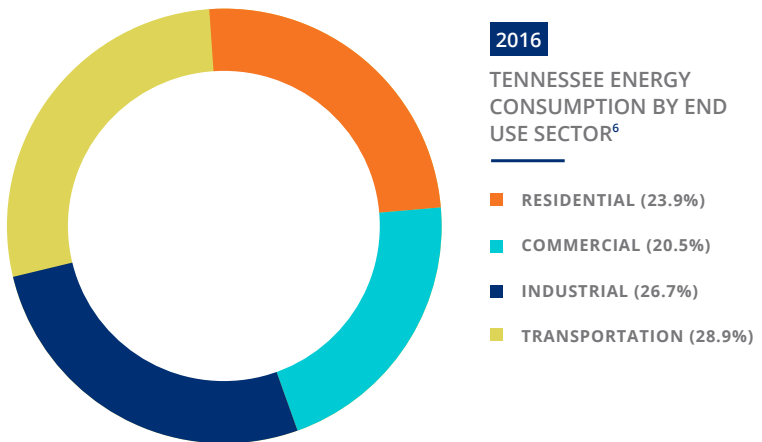
Norris Dam in Norris, TN

STATE OF TENNESSEE
ENERGY AND EMISSIONS PROFILE

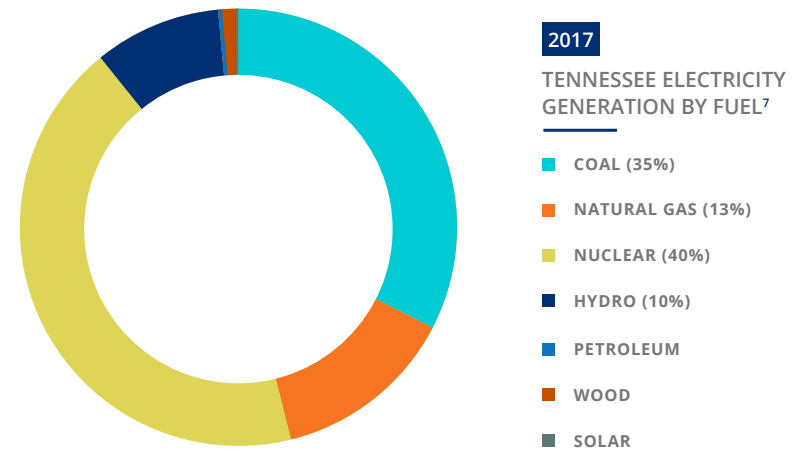
TENNESSEE-SPECIFIC GRAPHS

The Energy Information Administration (EIA) maintains some of the most comprehensive state-specific data on energy consumption, production, prices, and expenditures by source and sector. The following three graphs detail Tennessee's energy consumption by end-use sector, energy consumption estimates, and energy production estimates for calendar year 2016.⁶ For additional information and data on Tennessee, please visit <https://www.eia.gov/state/?sid=TN>.

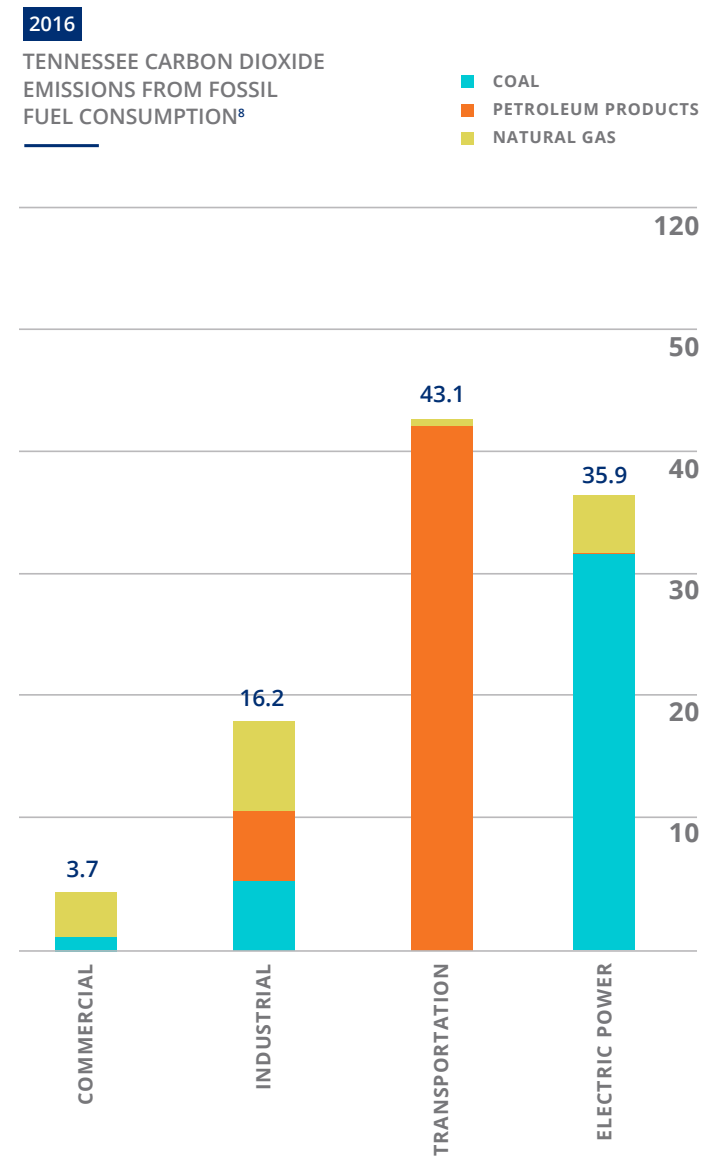




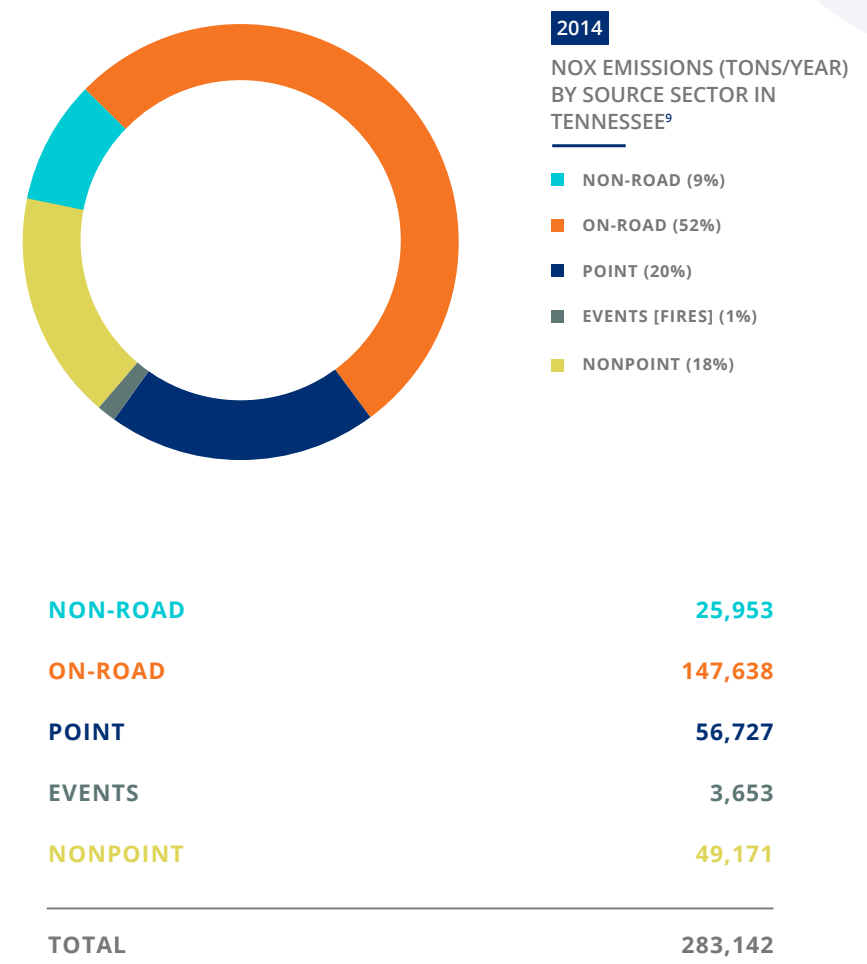
⁶ Data from two years prior is finalized by the EIA annually. The three EIA graphs can be accessed at <https://www.eia.gov/state/?sid=TN&tabs=4>.



⁷ From the Kentucky Energy Database, which is based on an aggregation of preliminary data submitted to EIA and published monthly.



⁸ Sourced from the 2014 National Emissions Inventory (NEI) Data. More information can be accessed at: <https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data>



⁹ Data from two years prior is finalized by the EIA annually. For more detail, visit: <https://www.eia.gov/state/seds/seds-data-changes.php?sid=US&2014>. The three EIA graphs can be accessed at <https://www.eia.gov/state/?sid=TN&tabs=4>

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